PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

PLANTERS' BULLETIN FORTY-EIGHT

CONTENTS

	Page
Editorial: The Natural Rubber Research Conference	47
RRIM 600 Series Clones in Estate Trials	49
Influence of Field Latex on Latex Concentrate Quality	60
Research Developments at the R.R.I.M.	65
Notes, Book Review, R.R.I. News	67, 68, 69

Price
50 Cents

May
1960

R R I

LOCATION. The Institute's laboratories and offices at the third mile, Ampang Road, Kuala Lumpur are open from 8 am to 1 pm and 2 pm to 4 pm on Mondays to Fridays, and from 8 am to 12.30 pm on Saturdays.

EXPERIMENT STATION AND FACTORY. This station of the R R I is situated 16 miles from Kuala Lumpur, at Sungei Buloh on the Kuala Lumpur — Kepong — Kuala Selangor road. Visits may be made on Mondays or Wednesdays by arrangement. There is a guest house.

CORRESPONDENCE. All LETTERS must be addressed to the Director, Rubber Research Institute of Malaya, Post Office Box 150, Kuala Lumpur. Special enquiries may be marked for the attention of particular officers. The address for TELEGRAMS is Searching, Kuala Lumpur. TELEPHONE: Kuala Lumpur 72051. PARCELS occasionally arrive without any indication of their origin. Senders' names and addresses should be written clearly on the outside of all packages, and advice of despatch should be given by letter or telegram.

PROHIBITED PLANT SPECIMENS. Attention of planters and others in territories outside the Federation of Malaya and the Colony of Singapore is drawn to the Malayan Plant Importation Rules which prohibit the importation into Malaya of any part of a plant, whether living or dead, unless it is accompanied by a permit issued by the Director of Agriculture, Federation of Malaya. No permit will be issued in respect of any diseased plant or any plant pest. Any plant imported in contravention of these Rules (whose object is to prevent the introduction of diseases or pests) will be destroyed without examination. Anyone outside Malaya who desires our advice on any matter that may require examination of living material must first enquire by letter.

ADVICE. Enquiries are invited from rubber producers in the Federation of Malaya, Singapore, the colony of North Borneo, and the territories of Sarawak, Brunei and Nigeria, who may require more detailed information applicable to their own special problems. Where it is considered necessary, visits will be made to estates in Malaya as convenient. Visits to estates in other territories are by special arrangement. The only visits for which charges are normally made are those of our clone indentification inspectors. INTERVIEWS should be arranged by letter, as members of the senior research and advisory staff are frequently absent on visits to plantations.

PUBLICATIONS. Subscription to all or any of our series of publications (*Planters' Bulletin, Journal, Reports*, and miscellaneous booklets) may be made by depositing $15 with us. An annual statement of account will then be submitted. We are unable to give annual subscription rates or any form of discount, but for multiple subscriptions a lower rate of initial deposit is acceptable. Postage is charged on oversea mailings. A list of 'Publications of the RRI' is available on request.

PLANTERS' BULLETIN

OF THE RUBBER RESEARCH INSTITUTE OF MALAYA

Kuala Lumpur May 1960 Number 48

Editorial: The Natural Rubber Research Conference

A multiplicity of conferences has become a familiar feature of our times, and familiarity has been followed, if not by contempt, at least by a certain measure of healthy scepticism. What benefits do conferences bring, and do we have them too often ? It would be appropriate now, as another conference on natural rubber research begins to take shape, to consider these questions and to see how they apply to our own industry.

The *Natural Rubber Research Conference* to be held in September this year is intended to overcome the limitations of geography — to bring together research workers from widely separated regions so that new concepts can be given wider currency and divergent ones reconciled. The unity of outlook and stimulation of new ideas which we hope to achieve in this way are particularly desirable at the present moment, when the industry faces competition and when the producing countries and organisations are prepared to sink parochial differences in the general interest. Looking at our past history from this point of view, it seems that we have not had too many conferences, but too few.

PAST HISTORY

International rubber conferences have had an interrupted history, and those of the rubber producers have had a particularly disjointed career. The early *International Rubber Conferences* started well, but after the sixth, at Brussels in 1924, and the seventh, at Paris in 1927, we hear no more of full-scale conferences on production research for many years.

The scope of the 1924 conference would seem inconveniently wide today; among the subjects covered were publicity, labour, accountancy, tapping systems, cover crops, medical research, packing for export and 'Pure Plantation Rubber for the Soles of Footwear'. That the men of 1924 had little to learn in the matter of seeking new outlets for rubber is well illustrated by the care with which the speaker on rubber soles surveyed the needs of every sport then known in England. Under 'Walking' we find 'For walking matches Crepe Soles have proved excellent; they save the great jar to the spine and are very light. This is proved by the recent walk from London to York, over 200 miles, in quicker time than is taken by a horse'.

An outstanding event in Malaya in 1938 was the Planters' Conference. At this meeting the R.R.I.M. staff and planters joined forces to discuss the role of cover plants in rubber growing. The need for further meetings of this kind is well recognised and it is planned to arrange such a conference in 1961.

An important series of conferences started in 1938 when the first *Rubber Technology Conference* was held under the auspices of the Institution of the Rubber Industry in London. There were further conferences in 1948 and 1954. Although plantation practices, including latex production and processing, were discussed in each of these meetings, pride of place was naturally given to the processing of rubber in the consuming countries. The same is true of the *International Rubber Conference* in 1959 at Washington, where great prominence was given to synthetic rubbers.

In our own field, the production of natural rubber, there has been a trend towards international meetings since the war. In 1949 the R.R.I.M. organised a meeting of research workers from both producing and consuming countries to discuss the quality and grading of natural rubber. A similar meeting, the *Latex Symposium*, was held at the R.R.I.M. in 1951.

The first full-scale conference for natural rubber research for two decades, the *Conference of Rubber Research Institutes in the Far East*, was held at Bogor in 1952. The meeting was in two sections, 'Agricultural' and 'Chemical-Technological'. Among the many important topics discussed there, technical classification of rubber and yield stimulation were especially prominent.

THE 1960 CONFERENCE

The success of these meetings, and the practical benefit derived from them, has encouraged us in our decision to hold a further conference in 1960. The 1960 conference will be wider in scope than the Bogor Conference in that it will include representatives of those institutes in consuming countries which are concerned with the further processing of natural rubber. We would like to regard the Bogor Conference and ours as the beginning of a logical series of conferences on natural rubber at fairly frequent intervals, each reviewing and summarising the progress of the intervening years.

The *Natural Rubber Research Conference* will be held at the Rubber Research Institute of Malaya from September 26th to October 1st, 1960. It is sponsored by the R.R.I.M., sanctioned by the Malayan Rubber Fund and supported by the Federation Government and the Rubber Producers' Council. Research institutes in all the major producing countries, research organisations of private concerns, and institutes concerned with natural rubber in consuming countries, have been invited to contribute papers; so far, eighty have been offered. In order to ensure that representatives of the planting community can take part in

the discussions, a limited number of invitations will be issued for distribution by the various planting agencies in Malaya.

The conference, timed to follow the meeting of the International Rubber Study Group in Kuala Lumpur, will be run in two concurrent sessions, one for research on the production of natural rubber and one for research on its preparation and use. One of the sessions will be held in the library of the Institute. The other will be in the specially designed conference room in the new building which was completed in 1959. The printed *Proceedings* of the conference will be published by the R.R.I.M.

The 1960 conference will be an important step forward in the co-ordination of natural rubber research, covering the whole field of current investigations in producing and consuming countries. It is appropriate (and this is said in a spirit of friendly rivalry with our overseas colleagues) that this conference should be held in a country which has recently become the world's leading producer of natural rubber.

RRIM 600 Series Clones in Estate Trials

IN THIS REPORT WE GIVE SOME RESULTS of the first two years of tapping in trials of the RRIM 600 series clones on estates.

As mentioned in the first report on the RRIM 600 series clones in *Planters' Bulletin 30*, May 1957, the two large scale trials at the Experiment Station were followed up by a large number of estate trials, designed by the R.R.I.M. and laid out with the help and co-operation of the estates concerned. The areas are treated as normal commercial plantings; regular visits are made by our staff to take measurements and to make various observations. The

Figure 1. Distribution of trials of RRIM 600 series clones on estates in Malaya.

distribution of estate trials over the country is shown in *Figure 1.*

In 1951 — 1952 the 'distributed block' trials were budded. They are small trials without replications, laid out on twenty-one different estates; each consists of five to fifteen ½-acre plots, planted with a selection from the RRIM 600 series and with RRIM 501 as a control. Each clone is represented in about twelve plots distributed over the twenty-one trials. Of the promising clones, only RRIM 605, 606 and 610 are included.

In 1952 a start was made with laying out complete, larger trials, with four or five replications per clone. Between 1952 and 1956 thirty-six trials were established containing RRIM 500 and 600 series clones and a number of Prang Besar and foreign clones.

By the end of 1959, eighteen distributed block trials and thirteen complete trials had been in tapping for one or two years.

Although the first years of tapping provide us with interesting information, it is far too early to make a final evaluation of the yield capacities of the clones.

The complete results of these trials will be published periodically in the R.R.I.M. *Research Archives.*

YIELD

The results of the various estate trials largely confirm the relative yields obtained in the two trials at the Experiment Station.

In Tables 1 and 2, yield per acre and per tree are summarised for a number of complete trials as an indication of the value of certain clones. A number of non-RRIM clones are included for comparison.

Because of the practice of opening a trial as soon as the most vigorous clone has 70% tappable trees, the yield per acre recorded for any particular clone is strongly influenced by the number of trees in tapping at the time. We feel, therefore, that in the early years of tapping the yield per tree is a better indication of yield potential than is the yield per acre.

In order to compare the various clones which occur in different trials, the mean yields per tree over the first two years of tapping have been calculated as a percentage of the control clone RRIM 501. On this basis, the clones have been roughly classified, as shown in Table 3.

It should be kept in mind that the increment in yield for RRIM 501 from the second to the third and fourth year of tapping is usually high; it is therefore probable that in future years the yields of the listed clones will compare less favourably with RRIM 501 than at present.

GIRTH

In general the classification of girth as given on page 45 of *Planters' Bulletin 30,* May 1957, was confirmed in the estate trials.

The girth increment of tapped trees is considered to be an important clonal character in connection with the risk of wind damage. RRIM 501

TABLE 1. ESTATE TRIALS — YIELDS OF PROMISING CLONES IN POUNDS PER ACRE PER YEAR

Experiment	*Year of tapping*	*RRIM 501*	*RRIM 600*	*RRIM 605*	*RRIM 606*	*RRIM 607*	*RRIM 623*	*RRIM 628*	*PB 86*	*PB 5/51*	*PB 5/63*	*PR 107*	*LCB 1320*
Experiment Station *	1	359	533	748	539	609							
	2	1081	1170	1285	1024	990							
	3	1427	1399	1412	1147	1112							
	4	1829	2135	1846	1621	1526							
Estate 1	1	267	444	284	217	409							360
Estate 2	1	408		994					489				360
Estate 3	1	751	630	843	635	962			392	908		452	
Estate 4	1	711		610	627				122				708
	2	1359		1175	1109				535				1028
Estate 5	1	381	443	369							397	269	542
Experiment Station *	1	605					1119	825					
	2	1162					1624	1826					
	3	1767					1925	2362					
Experiment Station *	1	521					944	835					
Estate 6	1	1017					788	833	613				
Estate 7	1	626									704	475	599
	2	1011									1402	955	938
Estate 8	1	440					577	615					

* Results of Experiment Station trials shown for comparison.

TABLE 2. ESTATE TRIALS — YIELDS OF PROMISING CLONES IN GRAMS PER TREE PER TAPPING

Experiment	*Year of tapping*	*RRIM 501*	*RRIM 600*	*RRIM 605*	*RRIM 606*	*RRIM 607*	*RRIM 623*	*RRIM 628*	*PB 86*	*PB 5/51*	*PB 5/63*	*PR 107*	*LCB 1320*
Experiment Station *	1	24.0	24.3	29.1	20.8	22.8							
	2	31.0	29.1	31.3	25.0	24.1							
	3	32.3	31.8	32.1	25.7	25.0							
	4	41.4	47.2	40.5	35.2	33.2							
Estate 1	1	20.9	24.7	28.1	13.8	22.9							16.0
Estate 2	1	16.8		24.8					15.6				
Estate 3	1	22.2	25.3	24.8	17.1	25.3			20.9	23.3		15.4	
Estate 4	1	17.5		21.6	15.2				14.3				13.3
	2	29.7		29.0	24.5				19.4				20.3
Estate 5	1	14.9	17.4	21.9							23.2	12.6	11.8
Experiment Station *	1	22.9					24.3	32.4					
	2	26.7					31.1	42.9					
	3	40.0					41.6	53.3					
Experiment Station *	1	20.4					25.0	37.8					
Estate 6	1	23.2					18.2	28.0	15.1				
Estate 7	1	21.2									21.4	15.1	18.0
	2	25.7									28.8	20.9	27.1
Estate 8	1	12.9					13.9	19.1					

* Results of Experiment Station trials shown for comparison.

TABLE 3. RANKING OF CLONES ON THE BASIS OF YIELD PER TREE

As a percentage of control (RRIM 501) in the first and second year of tapping.

% of RRIM 501	*Clones*
145	RRIM 628
125	RRIM 527, 624*, 626; PB 5/63
115	RRIM 605, 613, 614
110	RRIM 610*, 623; PB 5/51
100	RRIM 600, 616, 621, 629; PB 5/37, 24/3
95	RRIM 603, 607, 630; PB 9/82
90	RRIM 609, 617, 618, 625, 627; PB T495
85	RRIM 526, 620, 622; LCB 1320
80	RRIM 604, 606
75	RRIM 601, 611; PB T481
70	RRIM 608, 615, 619; PR 107; PB 86
60	RRIM 602, 612; PB 24/51

* The yield of RRIM 624 and 610 decreases in the third year of tapping.

has the lowest girth increment after tapping in all trials. A two-way classification of the clones according to their average girth (five years after budding) and their increment over the first two years of tapping is given in Table 4.

TABLE 4. CLASSIFICATION OF CLONES ACCORDING TO MEAN GIRTH AND GIRTH INCREMENT

Mean girth 5th year	*Girth increment of tapped trees*		
	Good	*Average*	*Poor*
Good	RRIM 612,623, 625	RRIM 601,603, 606,607, 621	RRIM 613,614
Average	RRIM 600,602, 604,609	RRIM 605,611, 615,616, 619,620, 622	RRIM 501,610, 626,627, 628
Poor	—	RRIM 617,629, 630 PB 86	RRIM 608,618, 624

WIND DAMAGE

Although wind damage has not been as serious in any of these trials as in the RRIM 613 and 614 plots at the R.R.I. Experiment Station

Figure 2. Wind damaged plot of RRIM 614 in a ten-year-old trial at the Experiment Station.

(see *Figure 2*), the following clones show damage in various degrees in estate trials: RRIM 613, 616 and 626, and to a lesser extent 614, 615, 621 and 625. Serious bending of RRIM 603 in the immature stage has been experienced on many estates.

The clones with the least average number of damaged trees over all trials are RRIM 604, 607, 609, 610, 612 and 623.

In one trial on coastal clay with a rather high water-table, frequent wind damage has occurred, mainly in the form of uprooting of the trees. Marked differences between the clones are evident, as is illustrated in *Figure 3.*

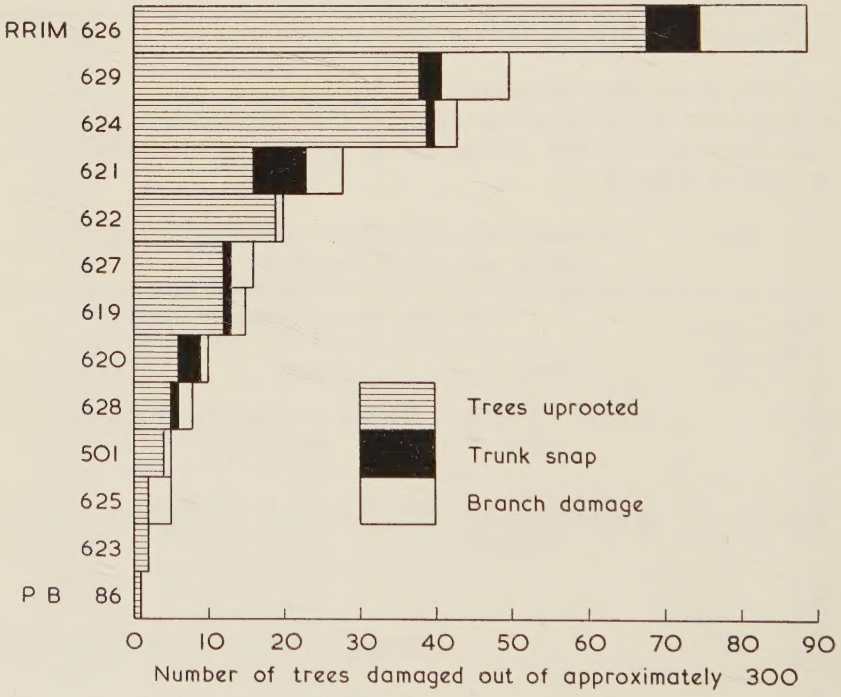

Figure 3. Incidence of wind damage to various clones in an estate trial on coastal clay.

DISEASE

The susceptibility of RRIM 501 to pink disease shows up in many trials. Other susceptible clones are RRIM 618, 627 and to a lesser degree

RRIM 603. Clones RRIM 606, 609 and 623 seem fairly resistant to pink disease.

A number of clones often show a poor canopy, and in many cases *Gloeosporium* is involved. We mention RRIM 526 (which suffers from serious *Gloeosporium* infection on various estates), RRIM 610 and RRIM 624.

Since tapping has started only recently, little information on susceptibility to brown bast is yet available. Clone RRIM 614 seems most likely to be susceptible.

CLONAL CHARACTERISTICS

RRIM 600

The girth is slightly below average; increment of tapped trees is good. Bark thickness is below average. The clone has a late branching habit, with a straight stem, upright branches and a narrow fan-shaped crown. The yield is good, particularly in the fourth year of tapping in the trial at Experiment Station. There has been one report of serious branch damage in a commercial area; the junction of the main branches and the stem seems weak.

A rather disturbing character is the bulging of the tapping panel which is experienced on many trees at the Experiment Station (see *Figure 4*). The stability of the latex is low. The colour of the crepe is white.

Figure 4. Bulging tapping panel of RRIM 600.

RRIM 603

This clone is no longer recommended because of the serious bending in the immature stage, which usually entails expensive roping. Also some trunk snap was experienced at the mature stage. The clone is very vigorous, and has a thick corky ('seedling') bark. The crown is usually wide and heavy. Susceptibility to pink disease is above average.

The latex is of low stability. The crepe is white.

RRIM 605

One of the most promising clones, in the same yield class as RRIM 501, but with better secondary characters. Growth is average and the girth increment of tapped trees is satisfactory. The bark is of average thickness; bark renewal is good. The clone has a straight stem, is rather low-branching and has a balanced wide crown. The foliage is usually

Figure 5. RRIM 607 at ten years from budding. Small, compact crowns after self pruning of lower branches (partly wintering).

dark and healthy. No wind damage has been experienced so far.

The latex has a high d.r.c. and is of marginal stability. The crepe is yellow.

RRIM 606

This is on the list of promising clones because of its attractive habit; yields are about 20% lower than those of RRIM 501 but are increasing. Growth is vigorous and the girth increment of tapped trees is good.

Branching is low, the crown heavy and the foliage extremely dense. Virgin and renewed bark are of average thickness. The clone seems resistant to pink disease.

The latex is of good stability; the colour of the crepe is pale yellow.

RRIM 607

An attractive clone of the same vigour as RRIM 606. The yield in the first two years of life is better than that of RRIM 501, but in the third and fourth year about 20% lower. Branching is very low, and in the immature stage the trees have a typical squat appearance. At a later age the crown becomes rather high due to self pruning (see *Figure 5*). No wind damage has been experienced.

The latex has a high d.r.c. and is of good stability; the crepe is yellow.

RRIM 609

Although this clone is not on the list of recommended clones, it has various promising characters.

Figure 6. RRIM 609, eight years after cutting back.

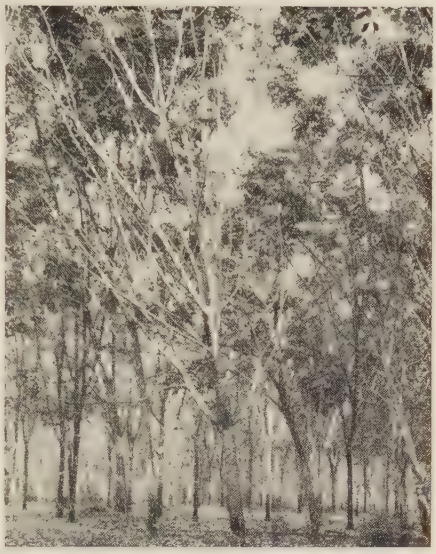

Figure 7. RRIM 614, with very irregular branching and unbalanced crown.

The growth is often below average in the first year of life, but girthing improves later, and the increment of the tapped trees is exceptionally high. The yield is in the same class as that of RRIM 606 and 607. The clone seems resistant to pink disease and no wind damage has occurred. The trees are rather tall with regular high branching and a small narrow crown (see *Figure 6*). Foliage is sometimes sparse, with marked yellowing of young leaves.

The stability of the latex is good. The crepe is pale yellow.

RRIM 610

This clone has been removed for the time being from the list of promising clones. Yields in the first year of life are very high but drop considerably in the second and third year. We must await information on performance in subsequent years before deciding whether to recommend this clone. Vigour is sometimes below average, and the increment of tapped trees is low. Foliage is often very poor. No wind damage has been experienced.

The latex has a low stability, and the colour of the crepe is deep yellow.

Figure 8. Vigorous RRIM 623 on the left; clone RRIM 629 on the right.

RRIM 614

While serious wind damage in immature stage was experienced with clone RRIM 613 in various trials, RRIM 614 shows no signs of liability to wind break before tapping. However, very serious damage to tapped trees was experienced in the trial at the Experiment Station and two other

trials (see *Figure 2*). Neither of these clones can be recommended for planting.

Both clones are above average in vigour; the increment of tapped trees however is poor. Branching of RRIM 614 is highly irregular; the crown is heavy and unbalanced (see *Figure 7*). The clone seems sensitive to brown bast.

RRIM 621

Although the yield of this clone is high it cannot be recommended because of its liability to wind damage. The trees are vigorous but tend to lean.

RRIM 623

The most vigorous clone of the series (see *Figure 8*); yield is probably in the same class as RRIM 501. The trees of this clone will come into tapping at least six months earlier than clones of average vigour like RRIM 501. Girth increment of tapped trees continues to be high.

Figure 9. Uniform high yield of RRIM 628 buddings during wintering.

The stem is fairly straight, branching is heavy and upright and the crown is rather narrow. The foliage is dense and healthy. Virgin and renewed bark are below average in thickness; bark renewal however is better than for RRIM 501.

Although the nature of the main fork does not exclude the risk of wind damage, no damage has been experienced so far in any of the trials. Susceptibility to pink disease is also below average.

The latex has a high d.r.c. and is of good stability; the colour of the crepe is light yellow.

There is little doubt that RRIM 623 is a very attractive clone which combines the high yield of RRIM 501 with all round good secondary characters, among which vigour and expected wind resistance are the most important.

RRIM 628

This clone continues to be an exceptional yielder (see *Figure 9*); while the promising clones RRIM 605 and 623 are in the same class as

RRIM 501, yields of RRIM 628 are about 40% higher. In the first six months of the fourth year of tapping in the trial at the Experiment Station (July — December 1959), yield per acre was 150% of that of RRIM 501; the actual yield for these six months was 1421 lb per acre. The outstanding yield in the first year of tapping was confirmed in three other trials.

Unfortunately other characters of this clone seem less favourable. Vigour is equal to RRIM 501 in some trials, less in others. As in the case of RRIM 501, girth increment of tapped trees is low. In view of the hypothesis that the serious wind damage in RRIM 501 after a few years of tapping is connected with this low girth increment, planting of RRIM 628 on more than an experimental scale is not recommended. There is also the chance that the continuous high yields will lead to brown bast; a tapping intensity of less than 100% is probably desirable for this clone.

On coastal clays trees of RRIM 628 lean slightly. Virgin bark is thick and bark renewal is good.

The latex is stable; the colour of the crepe is light yellow.

RRIM 526

This clone is included in five mature post-war trials. The growth is vigorous in the first two years of life, but thereafter usually falls below that of RRIM 501. Yields in the first three years of tapping are 10 — 30% lower than for RRIM 501.

From various commercial areas serious attacks of *Gloeosporium* have been reported.

RRIM 527

This clone is in the same yield class as RRIM 501 or even higher. RRIM 527 was discarded from our planting recommendations because of very serious wound reaction and some brown bast in one trial. Existing plantings of this clone may however prove satisfactory if tapped third daily.

Non-RRIM Clones

In many trials one or more non-RRIM clones were included and notes on their characteristics, based on these trials, are given below.

The results up to date confirm the high yields of PB 5/51 and PB 5/63.

Clone PB 86 usually shows its lack of vigour; yields are considerably below the level of RRIM 501.

Clone LCB 1320, which occurs in five mature trials, is of outstanding vigour. The yields per tree however are lower than for RRIM 501.

Clone PR 107 is well known for its good secondary characters, particularly its resistance to wind damage. It is included in eight trials; yields up to the third year of tapping are about 70% of RRIM 501, or about equal to PB 86.

How Variations in Field Latex Influence Latex Concentrate Quality

THE MAIN TYPE OF LATEX CONCENTRATE produced in Malaya is centrifuged latex. Only about 6% of the total output is creamed latex and another 6% is composed of evaporated latex and other types. The total production of latex concentrate in Malaya is now over 125,000 tons of dry rubber per year.

TESTS FOR QUALITY

The main properties of the finished concentrate which interest the producer, apart from the dry rubber content (d.r.c.), are mechanical stability (M.S.T.), KOH No., Volatile Fatty Acid Number (V.F.A. No.) and ammonia content.

If the ammonia content, V.F.A. No., and M.S.T. are satisfactory, then the other properties tested by the ASTM specification will be well within the limits required. Regular tests on the output of many Malayan factories have never indicated a KOH No., sludge content, coagulum content, or viscosity outside the specification range. Manufacturers are now insisting on certain ranges of mechanical stability (usually in the range of 500 and 1000 seconds) although it is by no means certain that mechanical stability is a determining factor in many processes.

We have found it best to rely upon the V.F.A. No., KOH No., and M.S.T. tests for quality control in the factory and for evaluation of the suitability of new clonal latices. However, if processing problems arise, chemical stability, chemical analysis and behaviour on foaming are also examined.

TAPPING SYSTEM

The various tapping systems employed at the present time influence the properties of the field latex, which in turn determine to some extent the properties of the centrifuged latex concentrate produced from it.

The effect of d.r.c. on the efficiency of centrifuging is clearly appreciated; efficiency falls off rapidly with a decrease in the d.r.c. of the field latex. Every effort should therefore be made in the field to prevent dilution of field latex: it should be kept free of washings from buckets and other utensils and preserved with gaseous ammonia instead of ammonia solution. Intensive tapping systems and the use of stimulants usually depress d.r.c. and are consequently to be avoided when producing latex for concentration. Latices with high percentages of ash and other non-rubber substances are also undesirable, since they lead to rapid clogging of the centrifuge.

Low tapping cuts and high tapping cuts give concentrated latices with different properties, as illustrated by the results in Table 1. In general, the mechanical stability of the concentrates from the high cuts is lower than that of concentrates from low cuts, but this is by no means a

general rule. However, in the case of Tjir 1, clonal latex from higher cuts is invariably less stable than latex from lower cuts.

TABLE 1. PROPERTIES AFTER ONE MONTH'S STORAGE OF LATEX CONCENTRATES FROM FIVE CLONES TAPPED AT HIGH AND LOW LEVELS*

Clone	*Tapping height inches*	*Mechanical stability, seconds*	*Magnesium content, % total solids*
Tjir 1 (a)	40	800	0.022
	90	365	0.045
Pil B84	40	1320	0.017
	90	1475	0.017
PB 186	40	1330	0.014
	90	1370	0.012
PB 23	40	840	0.023
	90	535	0.053
AVROS 49	40	1245	0.031
	90	815	0.034
Tjir 1 (b)	40	420	0.030
	90	195	0.050

The causes of this difference are not entirely clear, but it is known that magnesium in latex depresses the mechanical stability, and we have found that in some cases the magnesium content of latex increases with increasing tapping height.

Addition of phosphates to remove this magnesium has been suggested in several patents** and the practice of making controlled additions of phosphate to 'difficult' field latex is becoming more general in Malaya, but there is a danger of over-addition. Titration methods of estimating magnesium in latex are often used to ensure that the correct addition is made.

YIELD STIMULATION

The volatile fatty acid number (V.F.A. No.) test for natural rubber latex was developed at the Rubber Research Institute of Malaya as a measure of the bacterial spoilage which occurs in latex. It has been shown in experiments at the R.R.I.M. that latex from stimulated trees has a considerably greater bacterial population than that of latex from unstimulated trees. High bacterial counts are associated with high V.F.A. numbers and these are in turn associated with low mechanical stability.

We have observed that in latex tapped after stimulation, the V.F.A. No. is about twice the normal value for latex from unstimulated trees.

* High and low cuts on the same trees, except for Tjir 1 (b), where high and low tapping was on different trees within a block.

** Including B.P. 708,056 and U.S. 2,626,969.

This remains true irrespective of storage time after tapping, provided the same amount of preservative is added to both types of latex. Table 2 shows values typical of commercial latices from stimulated and unstimulated trees. The ammonia content happens to be lower in the latex from the stimulated area, but at most this factor would be responsible for only part of the difference.

The effect of delay in increasing the V.F.A. No. is also clearly seen in the Table — we therefore recommend that processing of field latex into concentrate should take place as early as possible and certainly within 24 hours of tapping.

TABLE 2. COMPARISON OF FIELD LATEX V.F.A. NUMBERS FOR LATICES FROM STIMULATED AND UNSTIMULATED AREAS ON AN ESTATE

Determination on latex tapped, collected, and ammoniated at 12 noon	*Unstimulated*	*Stimulated*
Ammonia content, wt %	0.48	0.42
V.F.A. No., hours after ammoniation		
„ „ „ 20	0.02	0.06
„ „ „ 28	0.04	0.13
„ „ „ 48	0.22	0.61
„ „ „ 72	0.42	0.78

Figure 1 illustrates the V.F.A. No. test results on field latices and V.F.A. No., KOH No., and M.S.T. test results on concentrated latices produced from them, for trees stimulated in the normal manner with 2,4,5-T and for untreated control trees. Before stimulation, latices from both plots had identical properties. The higher V.F.A. numbers and consequently lower M.S.T.'s of the latex from the stimulated trees is apparent.

In commercial practice, latex from stimulated trees must be preserved with increased amounts of ammonia. Thus instead of the 0.3 to 0.5% (by weight) ammonia usually added in the field collecting stations, 0.5 to 0.7% (by weight) should be added. The stimulated latex should preferably be segregated and processed immediately on reception at the factory, to avoid the development of high V.F.A. No., high KOH No., and low M.S.T. in the finished latex concentrate.

LATEX FROM NEWER CLONES

Much work has been carried out in testing the latex from new clones to select the most suitable for latex concentration: concentrated latex is prepared under controlled conditions and is tested initially for phosphorus, magnesium and M.S.T. after 1 and 3 months' storage. The results obtained are taken into account when planting recommendations

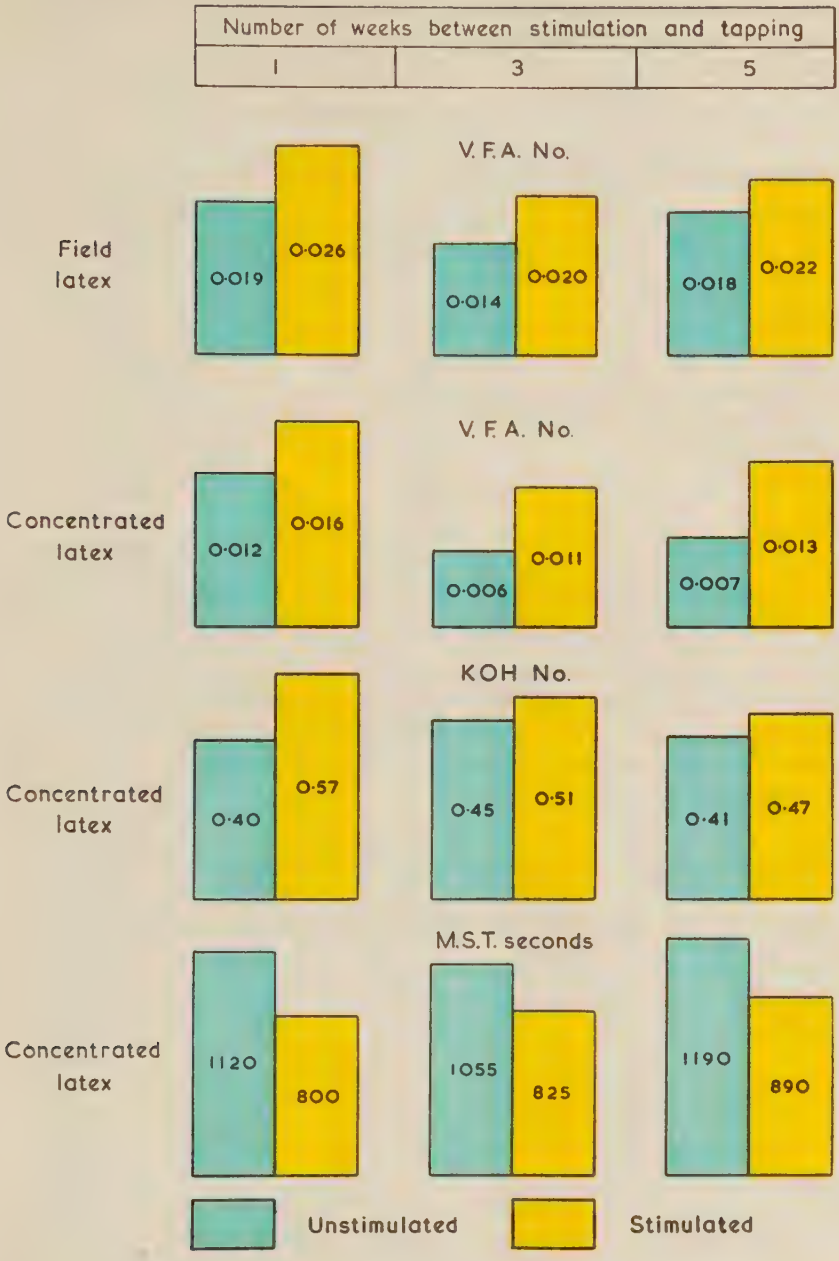

Figure 1. Properties of concentrated latex (after 3 months storage) derived from stimulated and unstimulated trees. The V.F.A. No. of the field latex before concentration is also shown.

are formulated. Certain properties of some of the newer clones, as compared with three established clones Tjir 1, PB 86 and Gl 1, are given in Table 3.

TABLE 3. PROPERTIES OF LATEX CONCENTRATES DERIVED FROM NEWER CLONES

Clone	*M.S.T. sec., after 3-months' storage*	*Magnesium wt %*
RRIM 501	1395	0.008
RRIM 527	315	0.019
RRIM 602	745	0.019
RRIM 614	1100	0.008
RRIM 615	710	0.018
RRIM 625	1435	0.014
RRIM 628	1035	0.010
Tjir 1	1005	0.021
PB 86	1095	0.006
Gl 1	165	0.056

IMPROVING LATEX CONCENTRATE

We have recommended early processing and adequate ammoniation of both field latex and finished concentrate, using the V.F.A. No. test as a basis for our advice. The results given in Table 4 for a typical factory show the improvements in quality obtained over eight months in 1954 by following this advice.

TABLE 4. PROPERTIES OF LATEX CONCENTRATES FROM A COMMERCIAL FACTORY SHOWING THE RESULT OF IMPROVED PROCESSING PROCEDURES ON CONSECUTIVE BATCHES

Batch numbers	*Sampling period, 1954*	*V.F.A. No.*	*KOH No.*	*M.S.T. sec. at 55% TS*
1 – 10	25 Jan. – 3 April	0.20	0.72	310
11 – 20	3 April – 8 May	0.13	0.66	380
21 – 30	8 May – 24 June	0.06	0.56	850
31 – 40	24 June – 29 July	0.07	0.57	861
41 – 50	29 July – 16 Sept.	0.03	0.50	959
51 – 60	19 Sept. – 26 Oct.	0.04	0.51	1150

The decrease in KOH No. and increase in mechanical stability with lowering of the V.F.A. No. are particularly marked.

Continual checks are carried out on the latex concentrate produced by many factories and, as a result of adjusting processing procedures,

the V.F.A. No. of latex shipped from Malaya at the present time is rarely above 0.05 and usually very much less.

The V.F.A. No. can change during shipment and it has not yet been clearly established how these changes can be controlled.

A certain amount of denaturation of the protein around the rubber particles in a latex appears to be desirable for obtaining good processing properties. This is best achieved by storing well-processed and preserved latex concentrate for more than three months. The initial improvement in the quality of foam rubber with age of the concentrate has been shown by foam tests carried out on samples of factory bulk concentrates from twelve large Malayan producers. Four foam formulations were used. Five gradings based on visual inspection of the final foam rubber were made. When the twelve latices were tested two to six weeks after preparation, only 15 first grade foams were produced from a possible 48, but the number rose to 28 after three months' storage, and to 34 after six months' storage.

PROPERTIES OF CONCENTRATED LATICES IN MALAYA

Extensive tests have been carried out on Malayan concentrated latices to establish the range of their properties. The standard of preparation is high and in general the results are very similar. The mechanical stabilities are the most variable property. There has been a tendency recently to produce latices of rather low mechanical stability and in some cases, where M.S.T. has fallen to a low level, soap has been added as a corrective with the consumer's consent.

Research Developments at the R.R.I.M.

It is our usual practice in this publication to present only firm recommendations to planters. Nevertheless, where new technical developments are concerned, we think it desirable to give readers an insight into certain projects which are still in an experimental stage. In this way we hope to assist plantations, planting agencies and engineering firms which may be working on similar projects or have them under consideration.

DEVELOPMENTS IN DRYING

Two-Stage Drying

Oil firing of drying sheds has become a necessity on many estates where firewood is in short supply. Recent increases in the price of oil fuel have emphasised the need for continuing the effort to improve drier design and operation and to keep drying costs down.

Many of the results of our research on drying have already been made available to the industry; they have shown (*Planters' Bulletin 46*, January, 1960, p. 22) that two-stage drying has potential advantages.

In order to determine the conditions under which maximum benefit can be derived from two-stage drying, a pilot-size experimental drier is being designed and will be erected at our Experiment Station at Sungei Buloh.

Conversion to Oil Firing

There are, however, still many instances where cheap firewood will be available for several years, and where wood-fired smokehouses are consequently more economic. In nearly all cases of new smokehouse construction we are recommending brick-built single tunnel smokehouses (R.R.I. Type B) or double tunnels with a partition wall (R.R.I. Type Double B), because these are more readily converted to oil firing than double-track single smokehouses (R.R.I. Type C).

Smokehouse Design

Although insulation of smokehouses does not appear to be economically justified by saving in firewood, there may be operating advantages which would justify the inclusion of insulation in a new smokehouse, particularly if it is known that conversion to oil firing will be required within a few years.

A new R.R.I. Double B smokehouse is already under construction at the Experiment Station; this incorporates several new features which require testing out under practical conditions before definite recommendations can be made to estates.

One of the tunnels is to be fully insulated and some half dozen different types of insulating materials will be tested. We are also installing a furnace of revised design intended to minimise distortion of the face plate, arch, and furnace case. Other factors to be studied are truck design, *beroti** shape and spacing, as well as methods of preventing the adherence of *beroti* splinters to the sheet; preliminary trials have indicated that covering a softwood *beroti* with aluminium sheet may be a useful method.

SKIM LATEX TREATMENT

The present methods of recovery of rubber from skim latex leave room for improvement; neutralisation of ammonia and coagulation require considerable quantities of sulphuric acid and this adds substantially to the cost of skim rubber recovery. De-ammoniation is practised to a limited extent to reduce the acid requirements, but, to our knowledge, no detailed design study of this operation has been carried out. The coagulum when formed is usually brittle and difficult to handle and the serum which runs to waste often carries a considerable amount of rubber with it and requires treatment in settling pits etc. to recover the rubber. The high acid content of the serum causes corrosion of factory floors and equipment.

* For the information of overseas readers, a *beroti* is a pole on which rubber sheets are hung to dry.

A programme of work has therefore been started to see to what extent the process can be improved. Design calculations have shown that there are possibilities, which seem worth practical investigation, for extracting and concentrating the ammonia in skim latex by distillation methods. De-ammoniation in itself is also useful in that it can sometimes simplify the treatment of the serum for disposal as waste. Laboratory-scale tests designed to obtain firmer coagula have also given some useful pointers towards possible improved coagulation methods, but the programme is still in a preliminary stage.

Supply of Clitoria Rubiginosa

Readers are referred to page 14 of *Planters' Bulletin 46* of January 1960, in which we describe this species, found on Chamek Estate. We stated that there was no commercial source of supply of *Clitoria rubiginosa* seed, but we now have information to the contrary.

We are informed by Chamek Estate that they have an established production nursery which is now being extended. They expect to be able to meet any demand for *Clitoria rubiginosa* seed in the near future.

In the light of this information planters may desire to try out the seed on a somewhat larger scale; we must await the results of further tests before saying whether it is an advance on other cover plant species, but we consider that it is well worth a trial.

Further Amendments to Planting Recommendations 1959-60

Readers are referred to our Planting Recommendations 1959 – 60 in *Planters' Bulletin 40*, January 1959 and also to the amendments to these recommendations on page 13 of *Planters' Bulletin 46*, January 1960.

There is now a further amendment to Class I, i.e. material for planting on a large scale, up to 80% of the area in aggregate. The Directors of Prang Besar Rubber Estate Ltd announce that they will now no longer offer their 'Further Proof A' and 'Further Proof B' seed for sale. In consequence this material should be deleted from our 'Planting Recommendations' and will not be shown in new recommendations to be issued by us on 1 January 1961.

Cancellation of Restrictions on Clones RRIM 600—630*

As from 31st December 1959, the Board of the Rubber Research Institute of Malaya has removed all restrictions on the sale of the clones RRIM 600 – 630 in Malaya, British North Borneo, Sarawak and Brunei.

All agreements relating to budwood of these clones were cancelled on that date and producers are now free to purchase or sell the budwood within the territories noted above.

* This notice was first issued on the inside back cover of *Planters' Bulletin 46*.

Readers are asked to note that the release of these clones does not imply any change in our planting recommendations in which we state that 'promising clones' of this series should not be used except for planting on an experimental scale.

'Stimulation of the Yield of Rubber Trees as a Routine Estate Practice'

Readers are referred to the above article in *Planters' Bulletin 45*, May 1959. On page 134 of the article a graph is presented to compare the performance on old rubber of a 2,4,5-T formulation applied half yearly below the tapping cut and 'Stimulex' (a 2,4-D formulation) applied monthly above the tapping cut. We wish to stress that the graph compares the two methods of application, not the stimulatory effects of 2,4-D and 2,4,5-T. Had both stimulants been applied in the same way it is unlikely that there would have been any marked differences in yield.

Under certain conditions application above the tapping cut has advantages which are brought out in the earlier part of the article.

Demonstration of Root Disease Control

The announcement in *Planters' Bulletin 46* of a new R.R.I.M. service — giving instruction in control methods to root disease gangs on estates — has led to a heavy demand which we have been unable to satisfy completely. The intervening wintering period, during which foliage symptoms cannot be used as an indication of disease, has inevitably caused some further delay in arranging all the visits that have been requested. Under these circumstances we ask managers not to expect immediate assistance; their requests have not been overlooked.

Book Review

DR A. JACOB and DR H. VAN UEXKULL. **Fertilizer Use: Nutrition and Manuring of Tropical Crops** (Translated by Dr C.L. Whittles). 1958, pp. 491, Hannover; Verlagsgesellschaft fur Ackerbau mbH.

This must be one of the most comprehensive books yet written on the manuring of tropical crops. In Part I there is a detailed discussion of the nutrient elements essential to plant growth, together with descriptions of the available range of organic and inorganic fertilisers. Fertiliser practice is discussed in relation to soil characteristics, and climatic and cultural conditions. Part II deals in some detail with the agronomy of all tropical crops of any importance and reviews current fertiliser practice for each crop. The comments on fertiliser usage in rubber cultivation are rather over-influenced by practice in Ceylon where potash is used in larger quantities than are normally desirable in Malaya, but the general approach is sound. Rice, tea, coconut and oil-palm are among the other crops discussed. A valuable feature for the technical reader is that in each case the more common nutritional disorders are described together with references to the original literature.

Part III is an Appendix of over 60 pages, in which is condensed a wealth of information of value to the technical agriculturist. Included among the 30

tables are tables of factors for converting data on the nutrient elements into terms of chemical compounds and fertilisers, and tables of data on the composition of the different organic and inorganic fertilisers. This Appendix also gives data on subjects as diverse as the relation of population and area with fertiliser consumption, and the characteristics of legumes used as green manures.

The book is illustrated by many black and white plates showing experimental work with a number of crops. Plate 77 is not well chosen, for it shows an unusual method of erosion control not found in present plantation practice.

A selected bibliography on plant nutrition and field experimentation, soils and fertilisers, together with an author index, completes a book which will be of interest to the general tropical agriculturist and a valuable source of reference for the agronomist. G.A.W.

New Buildings at the R.R.I.

Several new offices and laboratories have been constructed to provide for the recent expansion of R.R.I. staff and activities.

A new air-conditioned building, adjacent to the main R.R.I. Headquarters, was completed at the end of 1959. It is illustrated in our cover photograph. This building houses the entire headquarters staff of the Smallholders' Advisory Service and the Estates Advisory Service. There are additional laboratories and offices for the Botanical Division in the same building, and also an accounts office, photographic and drawing office and a lecture/conference room.

Additional laboratories and offices for Chemical Division have been constructed close to the present Chemical Division laboratories, which are consequently being reorganised.

At the R.R.I. Experiment Station at Sungei Buloh, an extension has been built to the Chemical Division laboratories. Facilities in the factory have been improved by the installation of a new crepeing battery, the construction of a Double B smokehouse and the doubling of the size of the packing shed.

The Botanical Division has been provided with new laboratories and offices at Sungei Buloh, and also two temperature-controlled rooms and an oven and preparation room.

New quarters for staff have also been provided, both at Sungei Buloh and Kuala Lumpur.

R. R. I. News

Dr R.C.H. Hsia returned to the Institute in February after three years' study leave in England. He will take charge of the Analytical work of Chemical Division..

Dr Hsia took his first degree at Peking University in 1940 and subsequently spent seven years at Chung Cheng University as lecturer in Chemistry. In 1953 he joined the graduate staff of the R.R.I.M. and worked at first on biochemical problems. In 1956 he was awarded a Sino-British fellowship and went to the Imperial College, London. As a result of his work there he was awarded the degrees of D.I.C. and Ph.D. for a thesis on 'Analytical Methods for the Determination of Inorganic Constituents of Rubber Latex Ash'.

Mr J.F. McEwen joined the staff of the R.R.I. Experiment Station as an Assistant Manager in March.

After working with the Forestry Commission, Cheshire, for two years, Mr McEwen studied Forestry at Aberdeen University and obtained his B.Sc degree in 1959.

o

Mr J.H. Chapman, B.Sc.(Agric.), has been transferred to the Estates Advisory Service as Advisory Officer on return from long leave. Mr Chapman joined the staff of our Experiment Station as an Assistant Manager in 1955, after completing his degree in Agriculture at Wye College.

o

In November 1959, Mr J. E. Morris, of the Chemical Division, presented a paper 'Recent Developments in the Production and Processing of Natural Rubber', by J.E. Morris and B.C. Sekhar, at the International Rubber Conference, Washington. Reprints of this paper together with others presented by staff of the British Rubber Producers' Research Association are being distributed to readers of the *Journal* in countries contributing to the Malayan Rubber Fund.

While in the United States, Mr Morris visited a number of American users of natural rubber with the twofold objective of explaining the uses of special natural rubbers, e.g. SP rubber, and of discovering what improvements were required in natural rubber. Mr Morris was able to attend meetings of the sub-committees of the American Society for Testing Materials dealing with latex and dry rubber testing.

On his way back to Malaya, Mr Morris lectured to the Japanese Rubber Engineering Association in December. The lecture was very well received and the substance of it is to be reproduced in the Japanese journal *Gomu*. He also visited a number of Japanese users of Malayan rubber.

o

Mrs Joyce Tambling left the service of the R.R.I. on March 31st, following her husband's transfer to Singapore.

Mrs Tambling began her work as Publications Assistant in November 1952, only a few months after the first issue of the New Series of *Planters' Bulletin* had appeared.

She has thus 'seen through the press' almost all the forty-eight numbers of *Planters' Bulletin* published to date, in addition to our *Annual Reports, Journals* and numerous other publications. Readers of *Planters' Bulletin* will join the staff of the R.R.I. in thanking her for the great energy, care and attention to detail which she has devoted to these duties.

International Rubber Conference in West Berlin, 1960

The Deutsche Kautschuk-Gesellschaft E.V., Frankfurt am Main, will hold an international conference on rubber in the West Berlin Kongresshalle on 4 — 7 October 1960. It will consist mainly of contributions to the chemistry, physics and technology of synthetic rubber and man-made fibres.

R.R.I. Lectures to Planters

This is a revised list of lectures available to Planters' Societies. When requesting a lecture, please name alternative titles and give the Director adequate notice of your requirement.

Soils Division

Observations on manuring of rubber based on results of field experiments
Current thoughts on ground covers in rubber areas
Recognition of nutrient deficiency symptoms shown by rubber and legume covers (evening lecture)
The absorption and translocation of nutrients by plants (evening lecture)

Botanical Division

Work of the Botanical Division
Breeding and selection of RRIM clones
Planting material in practice
Tapping and stimulation of yield
Factors affecting the performance of *Hevea*
Further work on yield stimulation

Pathological Division

Root disease control and the role of fungicides
Diseases and injuries of the stem and branches (evening lecture)
Recognition of pests (evening lecture)

Chemical Division

Superior processing rubber
Latex concentrate production
General processing of plantation rubber
Synthetic rubber
Technical liaison between producer and consumer

Statistics

Planning field experiments

Advisory

The Estates Advisory Service and its work on field problems

OUR COVER SHOWS THE NEW BUILDING

AT R.R.I. HEADQUARTERS, AMPANG ROAD.

SEE NOTE ON PAGE 69.

The Standard Engravers & Art Printers, 63 Campbell Road, Kuala Lumpur, Selangor